

SoilGrids1km

a proposal for an automated system for global soil mapping (to support the GSP initiative)



World Soil Information

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Thanks to:

- **Soil data contributing organizations:**
 - USDA-NRCS, EC JRC, FAO, INEGI/CONABIO, University of São Paulo, Chinese Academy of Sciences ...
- **ISRIC staff:**
 - Niels Batjes, Eloi Ribeiro, Bas Kempen, Gerard Heuvelink, Maria Ruiperez Gonzalez, Johan Leenaars and others.
- **ITPS / Global Soil Partnership**
 - Luca Montanarella and Ronald Vargas



In 10 minutes (I promise)

- **What are Global Soil Information Facilities (GSIF)?**
- **What is SoilGrids1km? (how were these maps made?)**
- **How to move forward with GSP Pillar 4?**



GSIF

- Software tools and data portals for global soil mapping.
- Developed at ISRIC, jointly with an international network of contributors.
- Implemented mainly using the **Open Source software**.

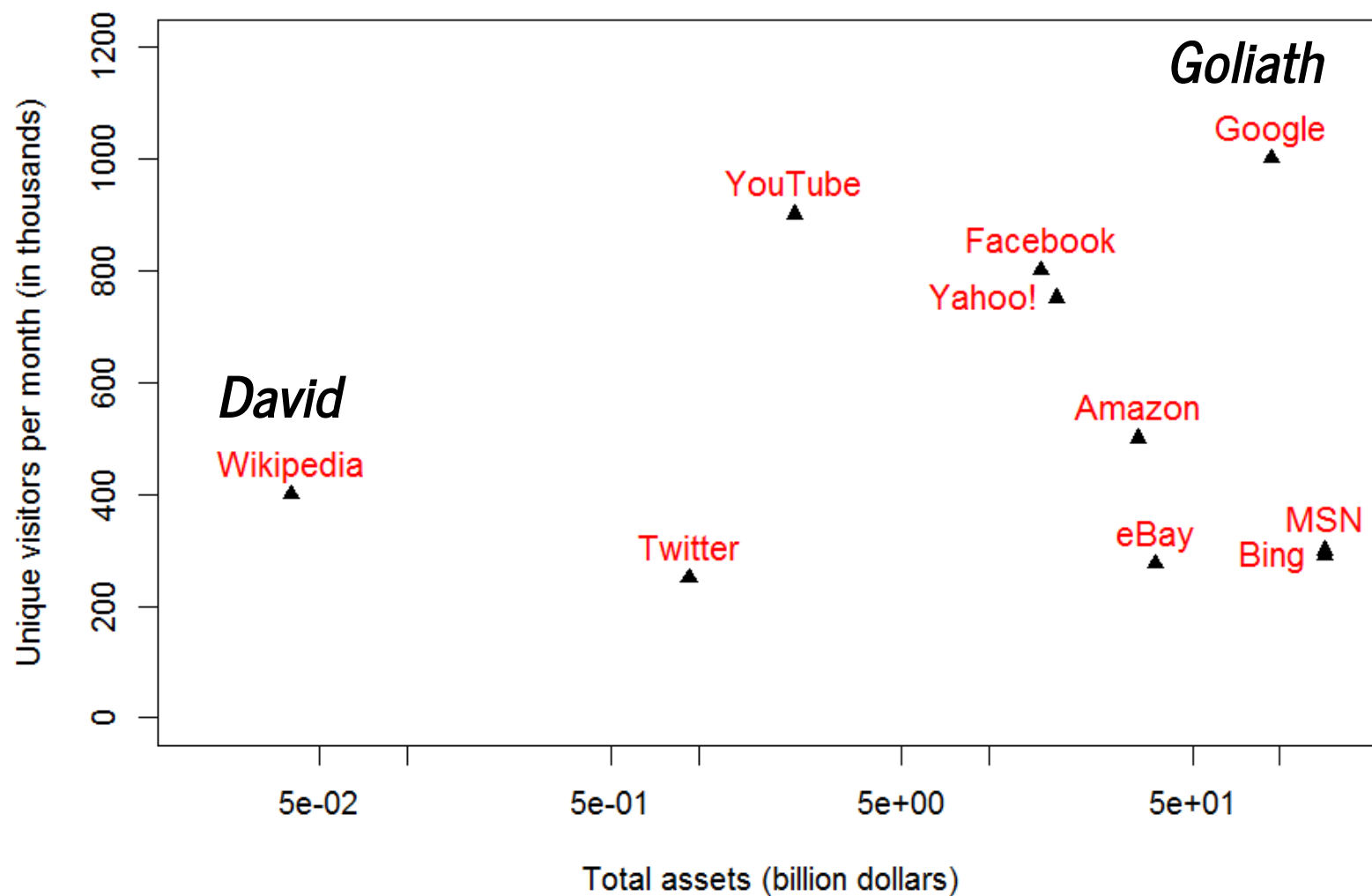


"The dream"

To provide public access to global soil
data **ANYTIME ANYWHERE**
(from mobile devices)



Inspiration for GSIF #1



Inspiration for GSIF #2



 **creative
commons**



Geo-Wiki... what about Soil-Wiki?

HELP TO VALIDATE GLOBAL LAND COVER



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- » Instructions
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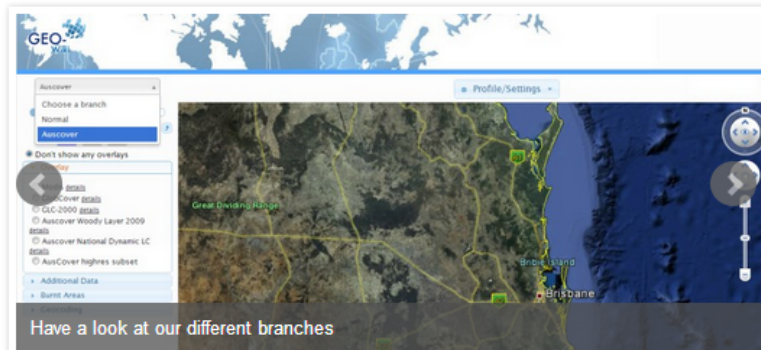
Branches

- » Geo-Wiki branches
- » AusCover Geo-Wiki
- » LACOVAL

The Geo-Wiki Project

The Geo-Wiki Project is a global network of volunteers who wish to help improve the quality of global land cover maps. Since large differences occur between existing global land cover maps, current ecosystem and land-use science lacks crucial accurate data (e.g. to determine the potential of additional agricultural land available to grow crops in Africa). Volunteers are asked to review hotspot maps of global land cover disagreement and determine, based on what they actually see in Google Earth and their local knowledge, if the land cover maps are correct or incorrect. Their input is recorded in a database, along with uploaded photos, to be used in the future for the creation of a new and improved global land cover map.

- [View publication](#)
- [Watch the tutorial video online](#)
- [Download Data](#)



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Try Geo-Wiki

Administration

- » Smartphone Legends

Tweets

Cropland Capture @CropCapture 12h
And the #Winner of week 2 is euphrat with gigantic 17005 points!
#CroplandCapture #HelpScience
#MakeWorldBetter #SolveHunger

Cropland Capture @CropCapture 12h
2nd place is Simone Ortner with



World Soil Information

GSIF components

- 1. WorldSoilProfiles.org,**
- 2. WorldGrids.org,**
- 3. R packages,**
- 4. WOSIS DB / WebServices,**
- 5. SoilGrids,**
- 6. SoilInfo App**

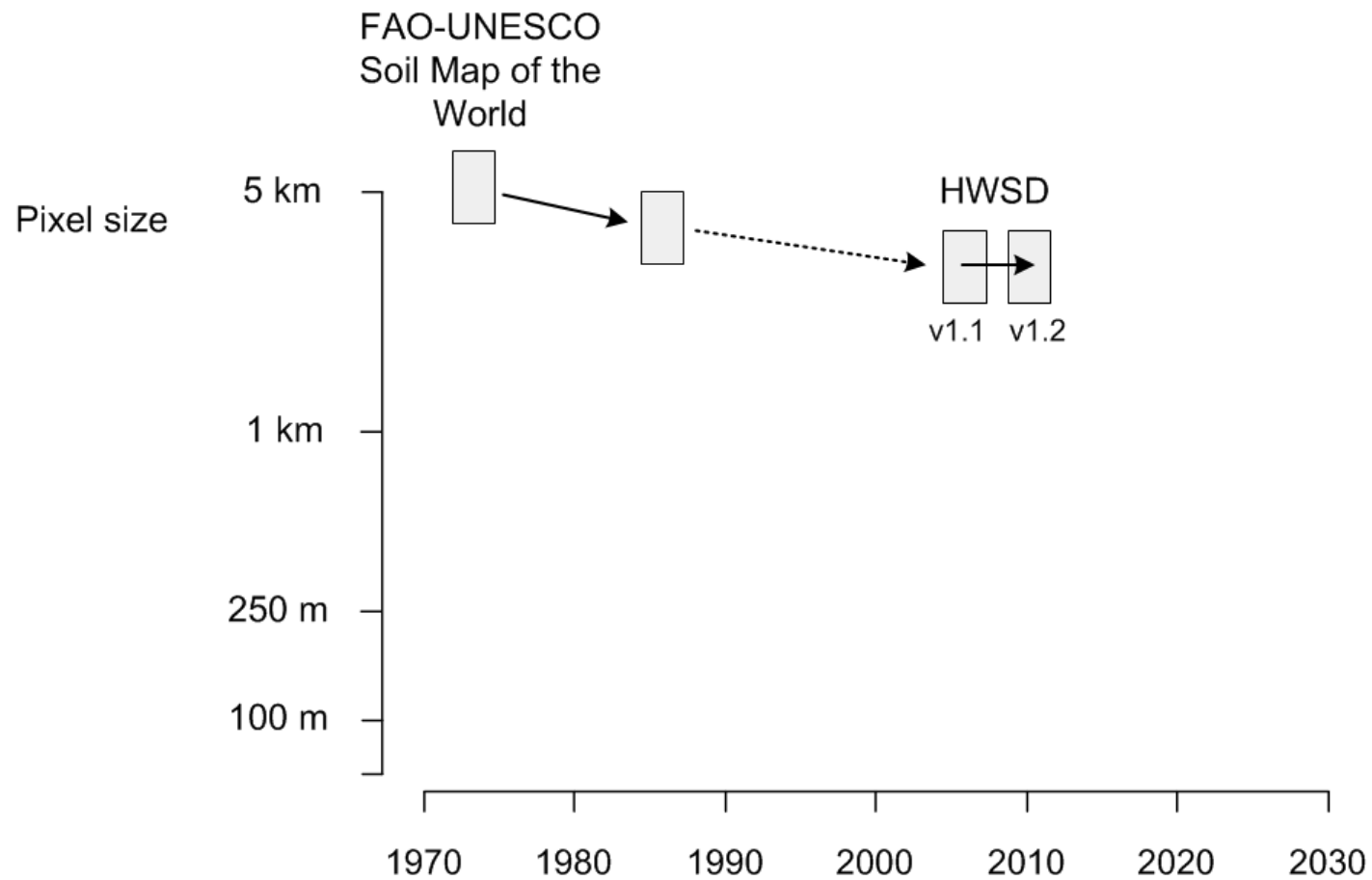


SoilGrids1km is more than a map!

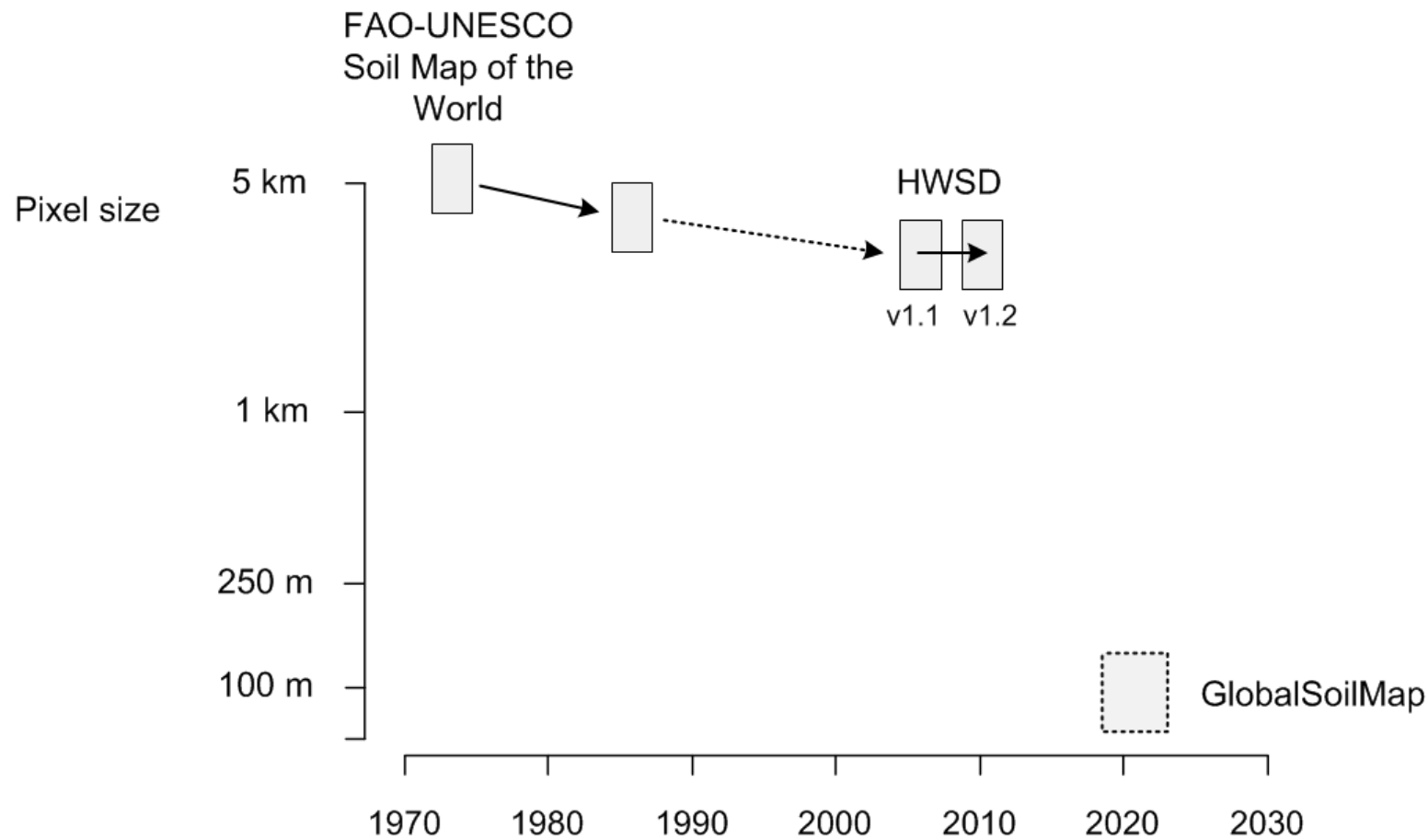
- **SoilGrids = a system for automated global soil mapping based on distributed soil profile and covariate data.**
- **It implements the state-of-the-art statistical methods to generate spatial predictions.**
- **It is a system that generates publicly available soil maps... while we sleep.**



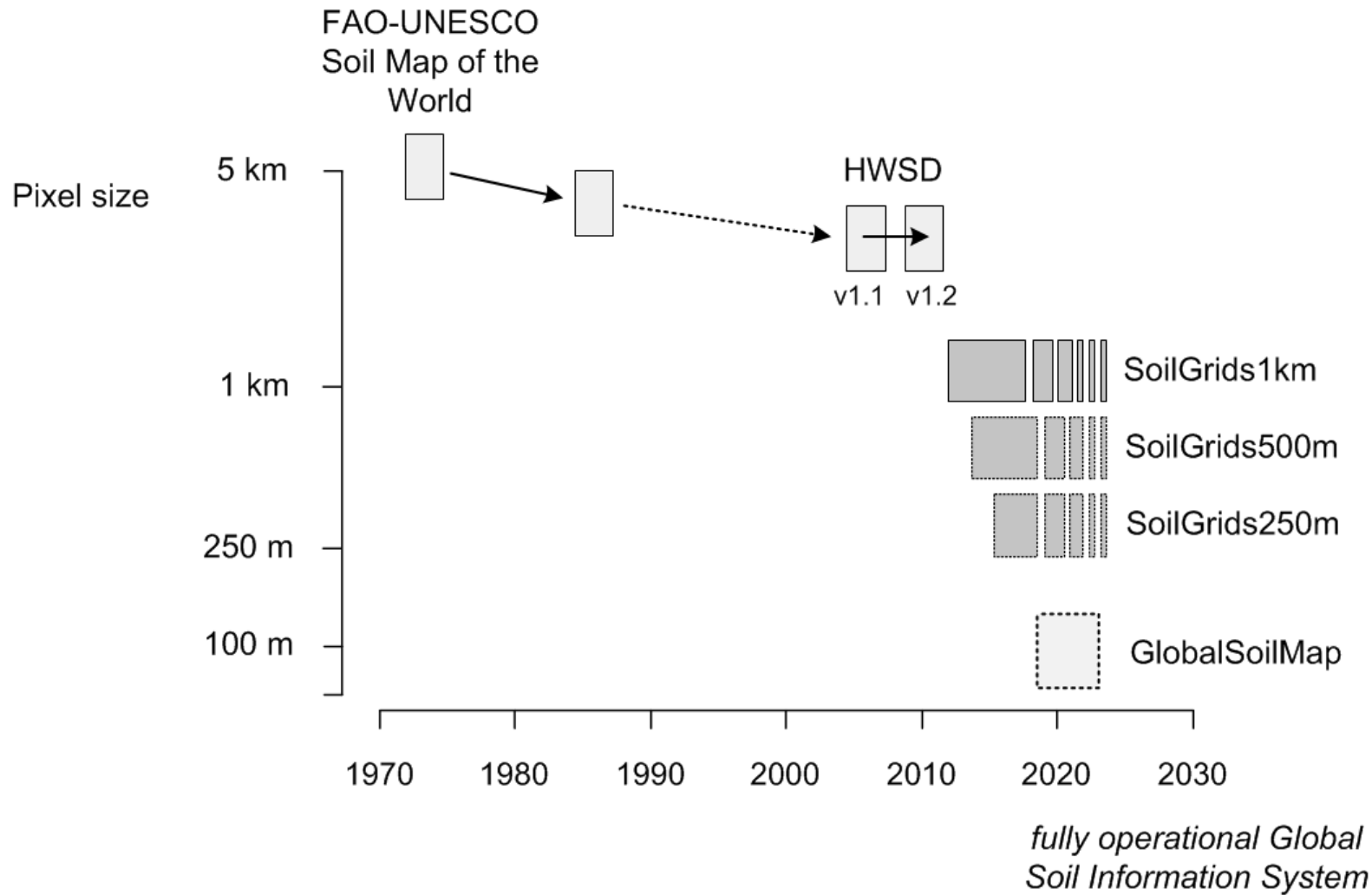
Why SoilGrids1km?



Why SoilGrids1km?

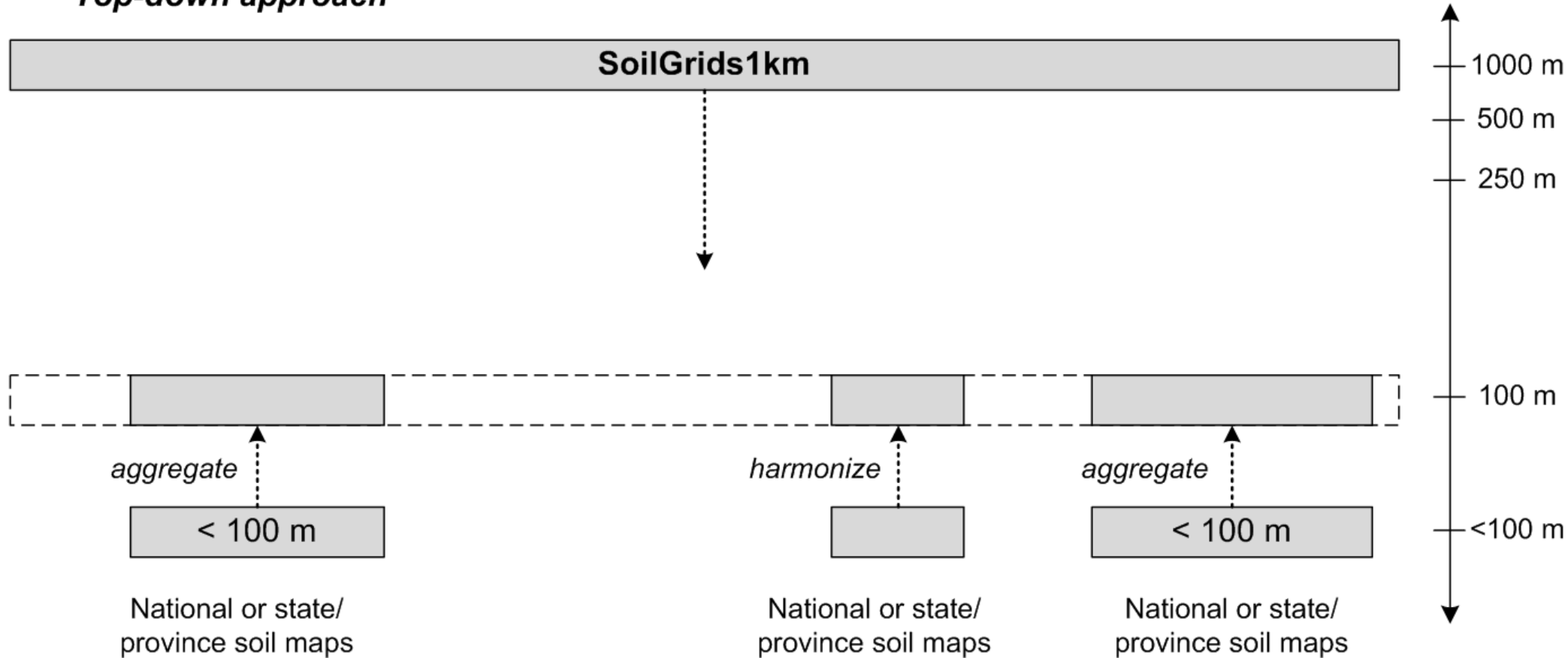


Why SoilGrids1km?



Two approaches to soil mapping

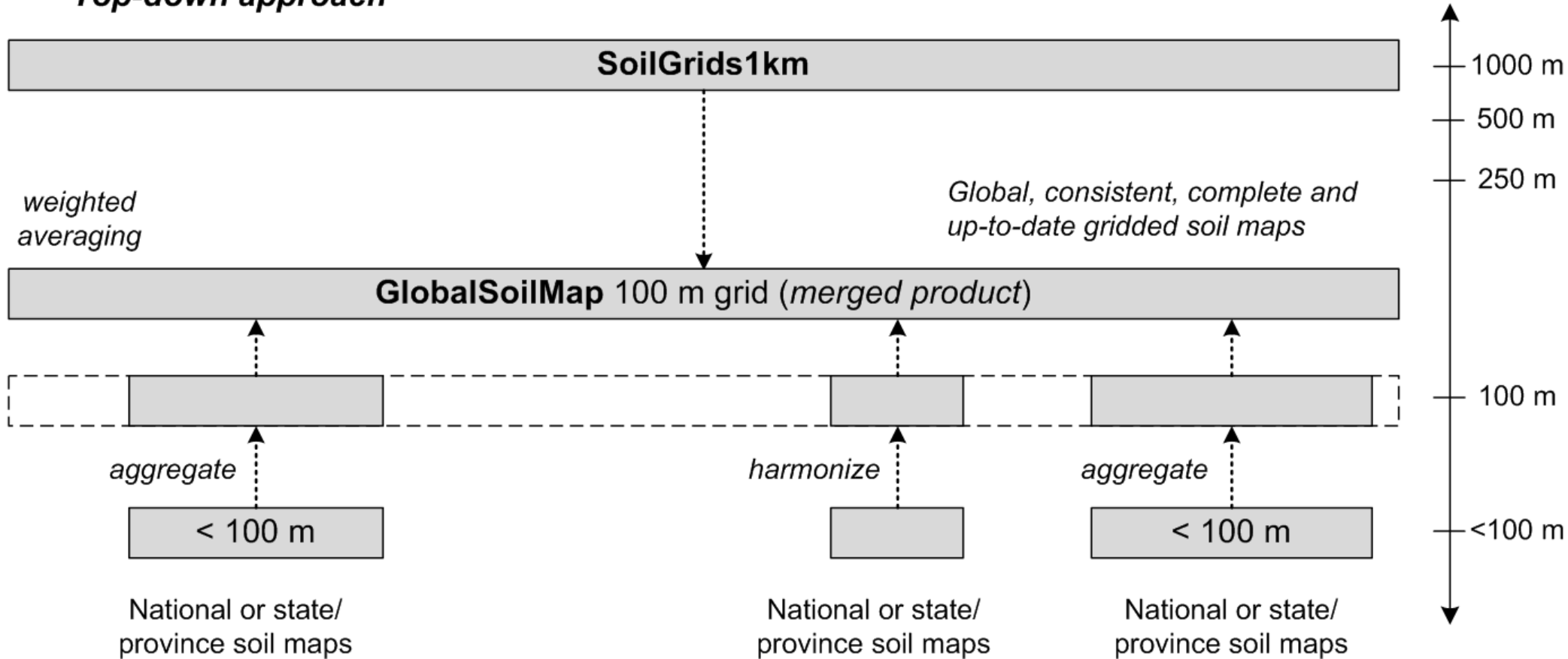
Top-down approach



Bottom-up approach

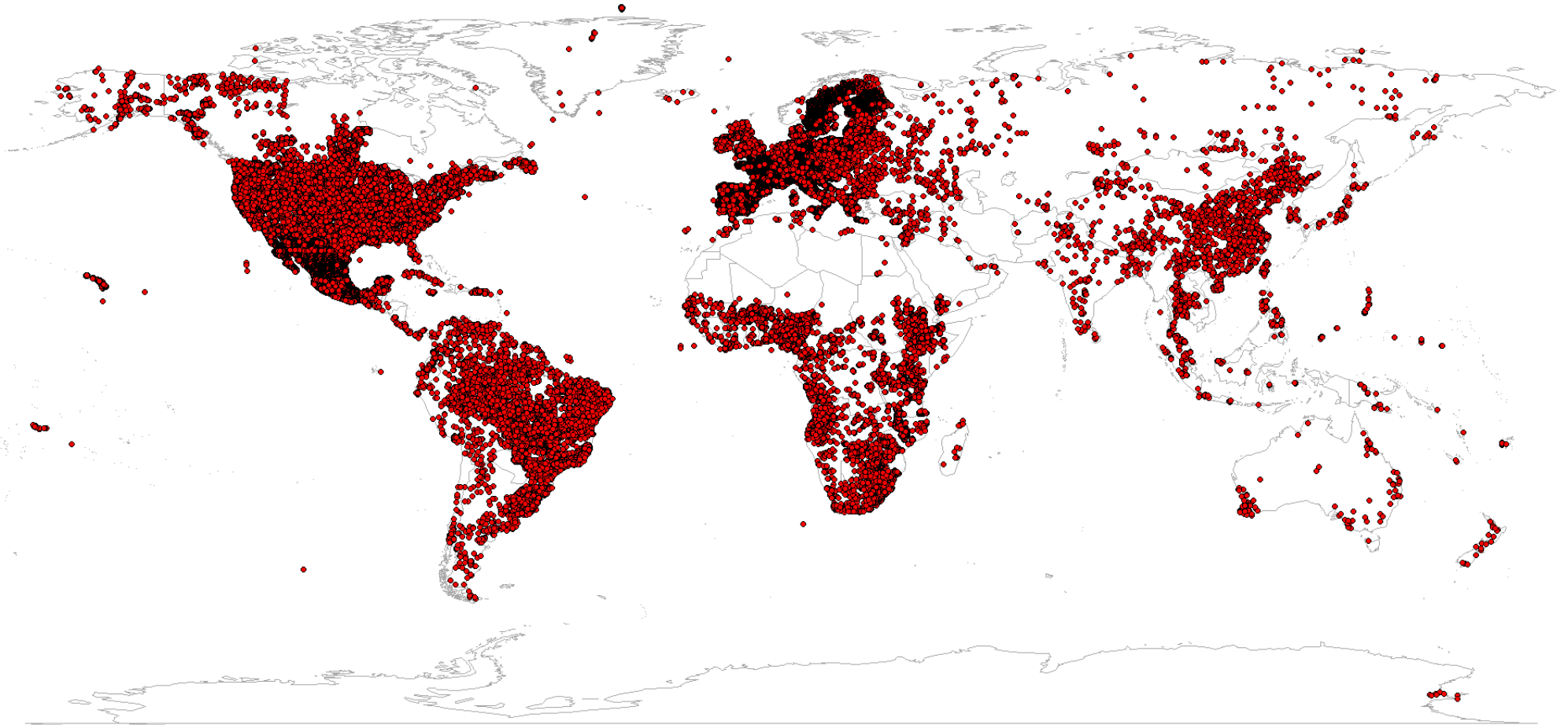
We need them both!

Top-down approach



Bottom-up approach

Main input: about 100,000 points

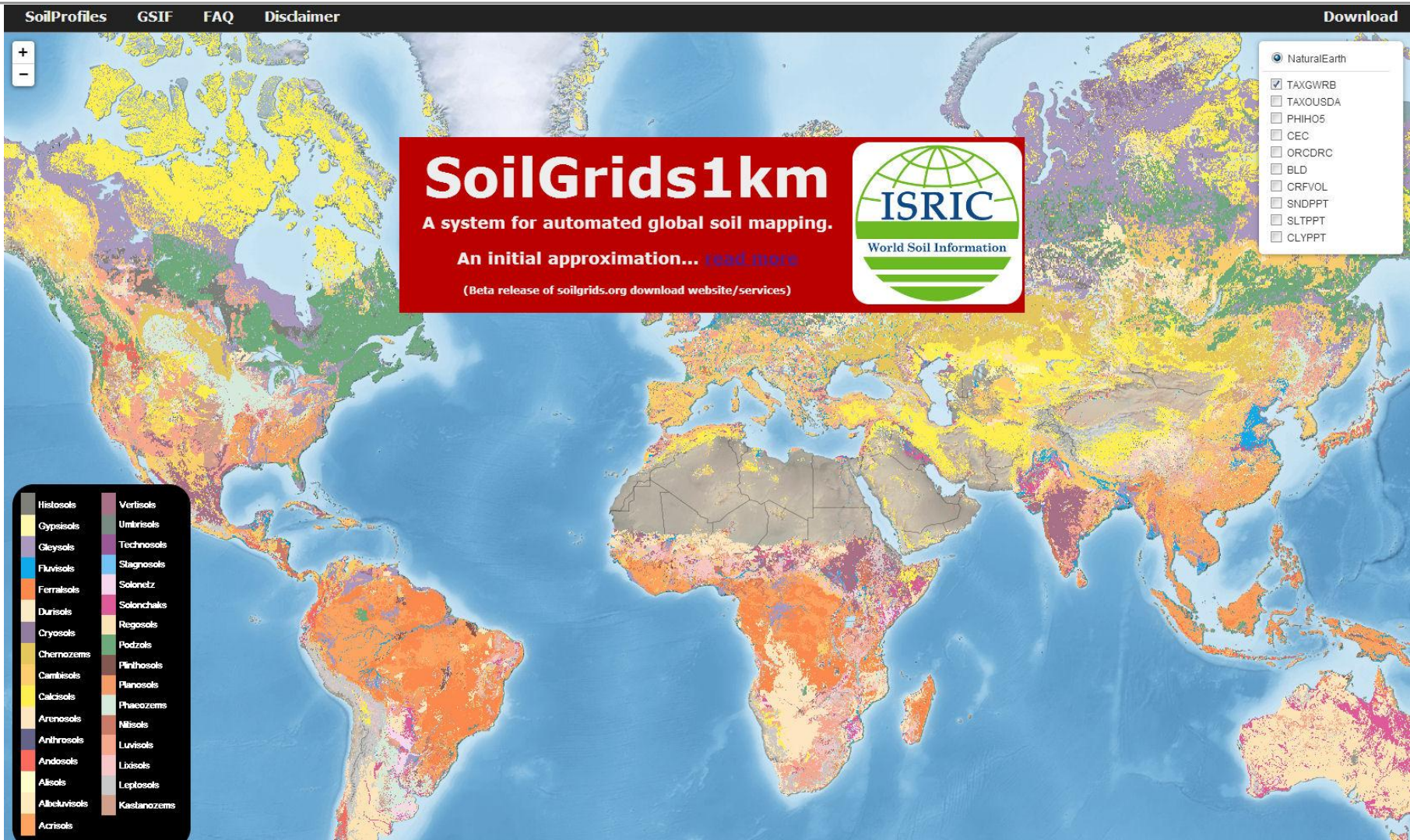


Results (spatial prediction models)

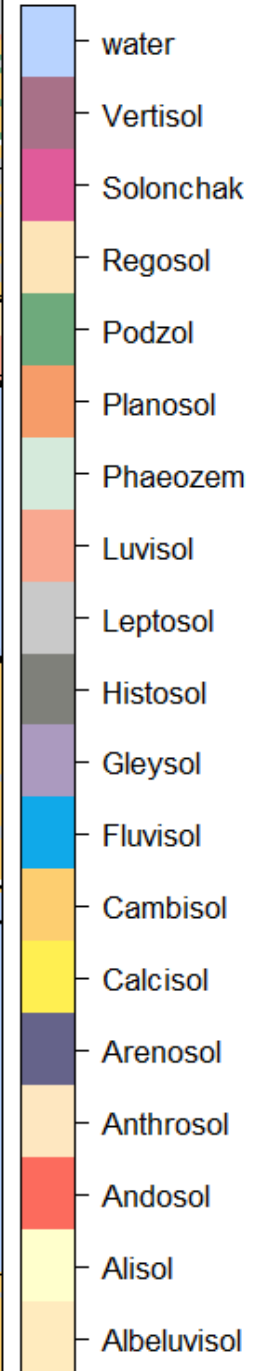
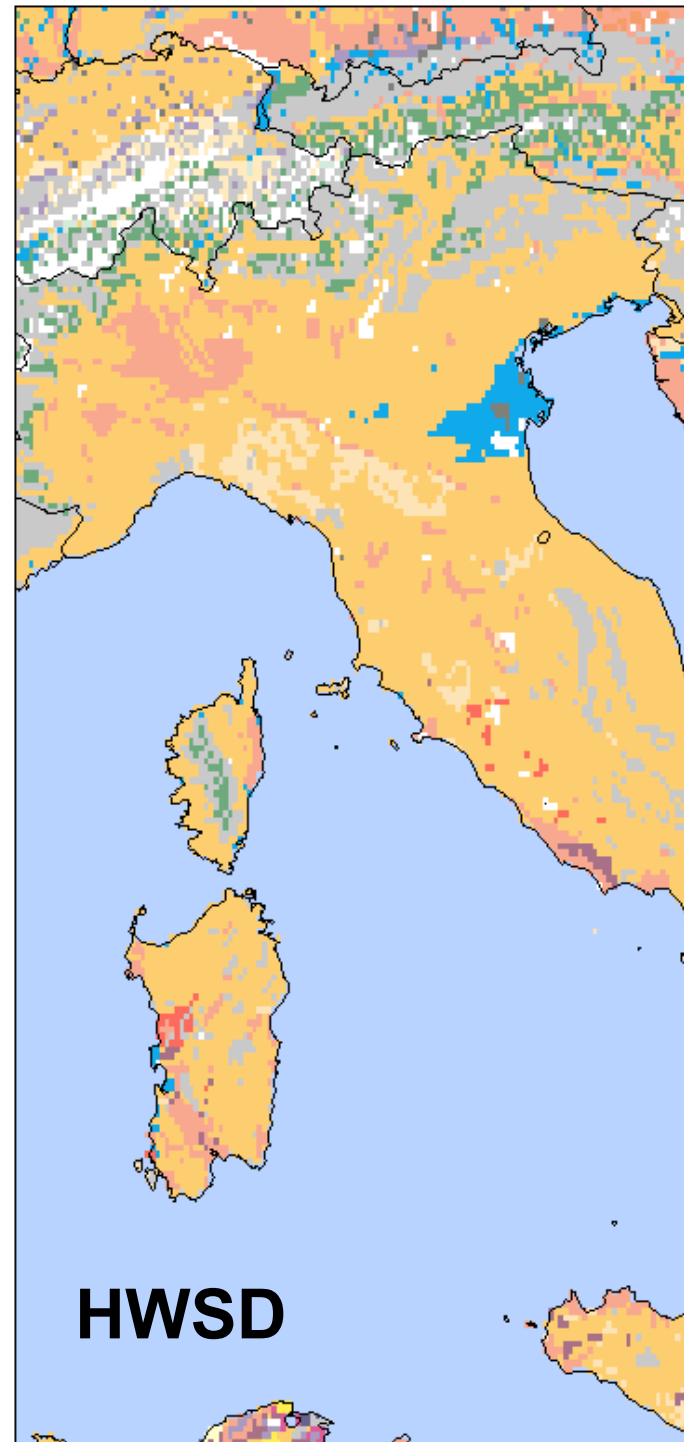
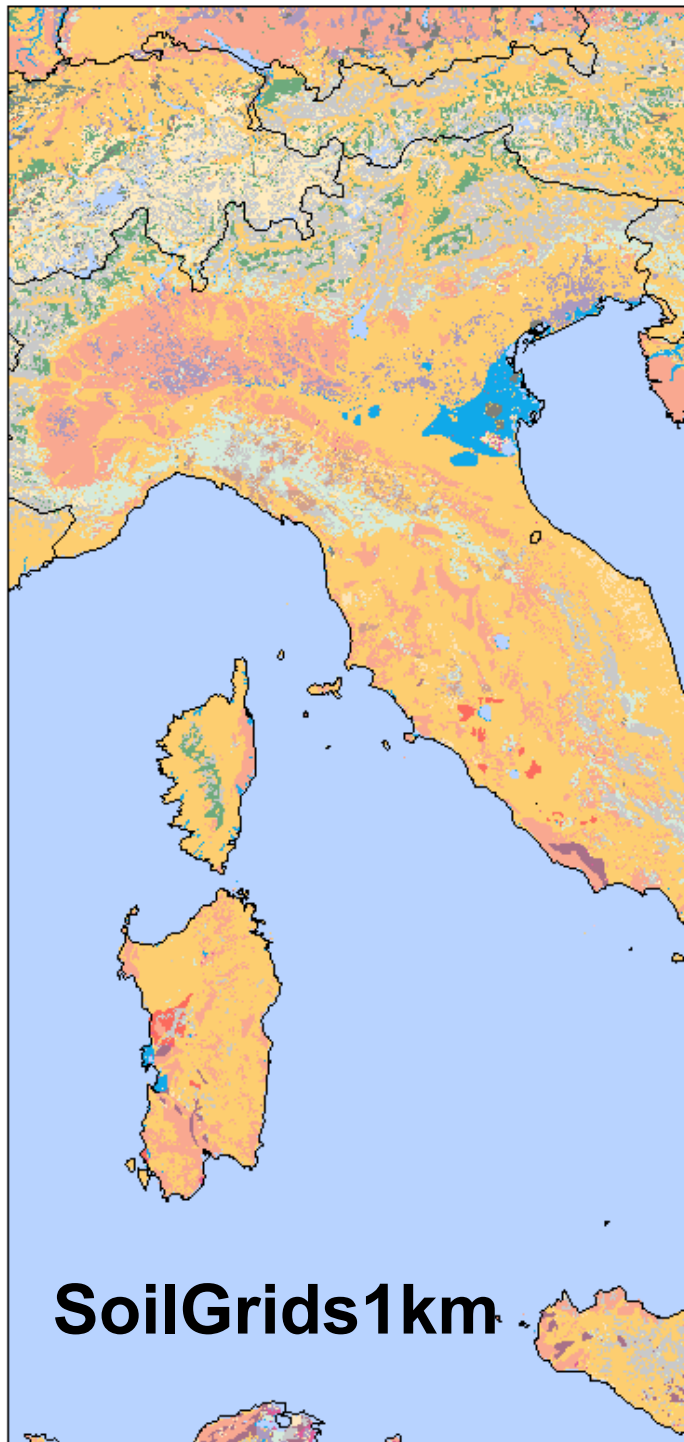
<i>Soil variable</i>	<i>Variance explained (model fitting)</i>
Soil organic carbon (g/kg)	50.1%
Soil pH	50.6%
Sand, silt, clay	22-35.5%
Coarse fragments	22.3%
Bulk density	32.6%
CEC	32.3%
WRB soil groups	kappa 36.8% (33.3% purity)
KST suborders	kappa 38.2% (45.4% purity)



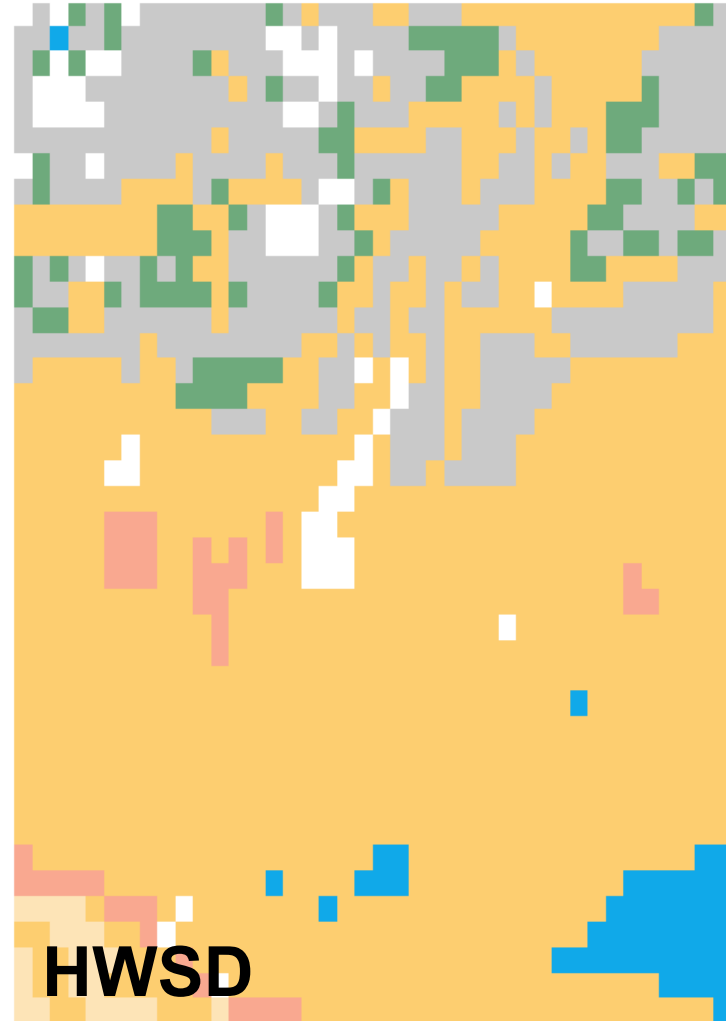
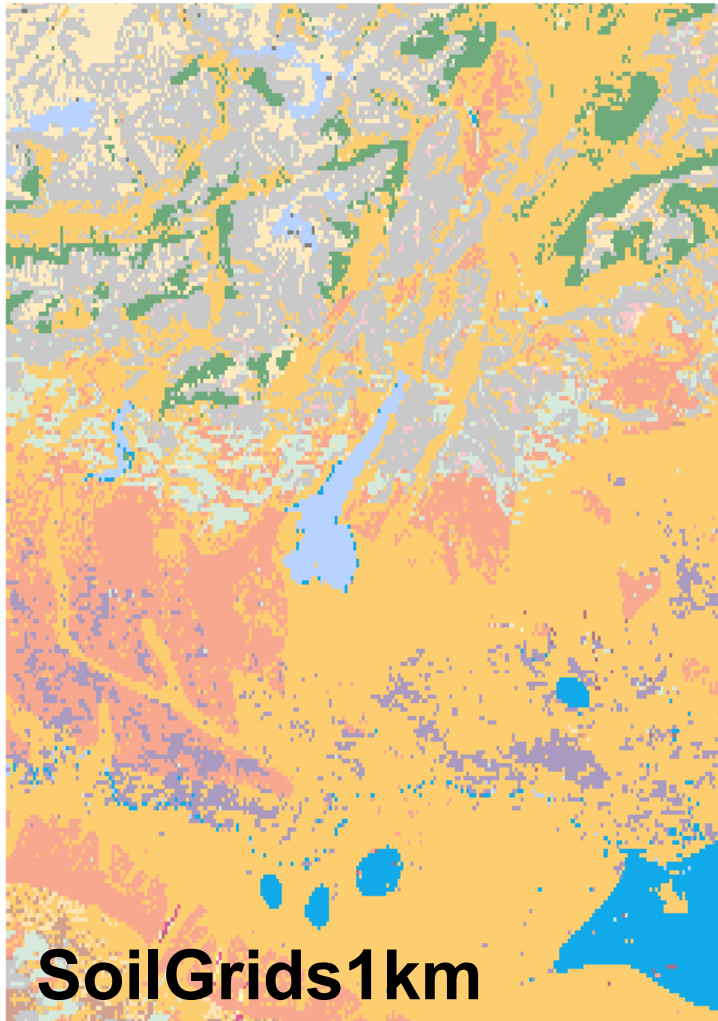
Let's look at the website: SoilGrids.org



World Soil Information



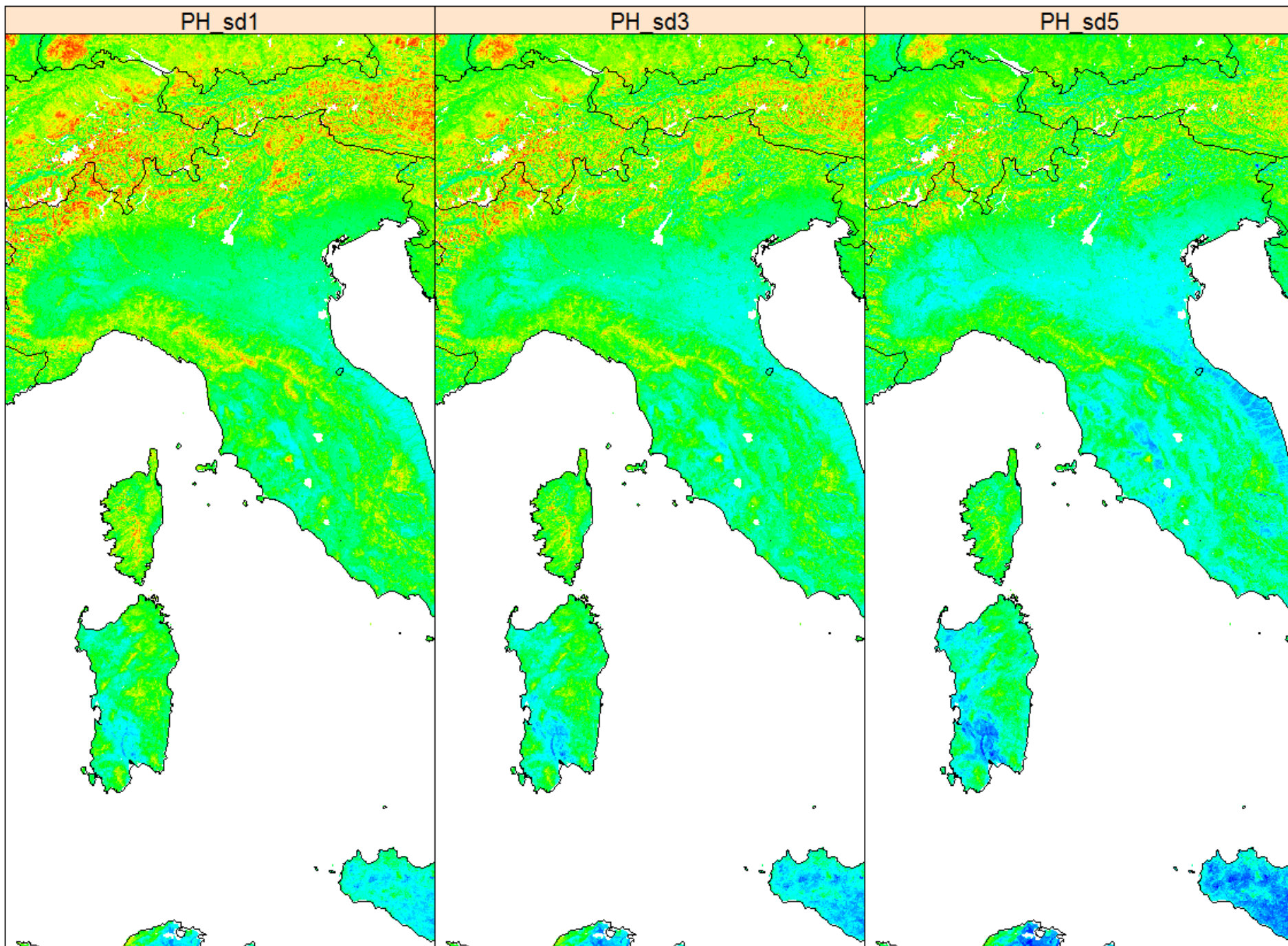
SoilGrids1km vs HWSD



soil pH (0-5 cm)

soil pH (15-30 cm)

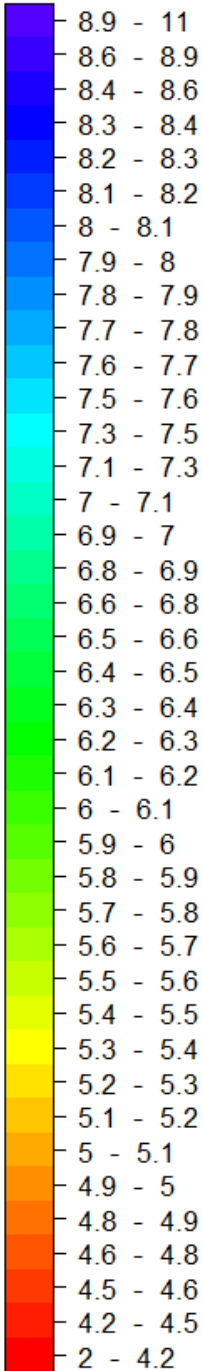
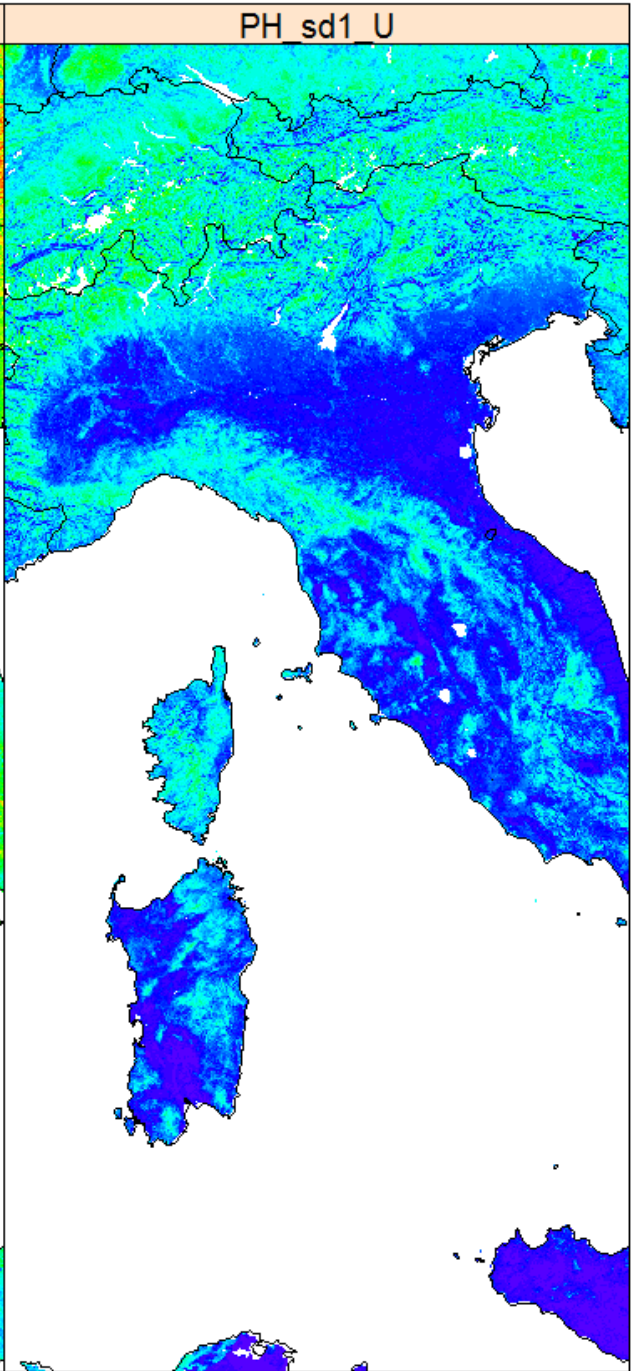
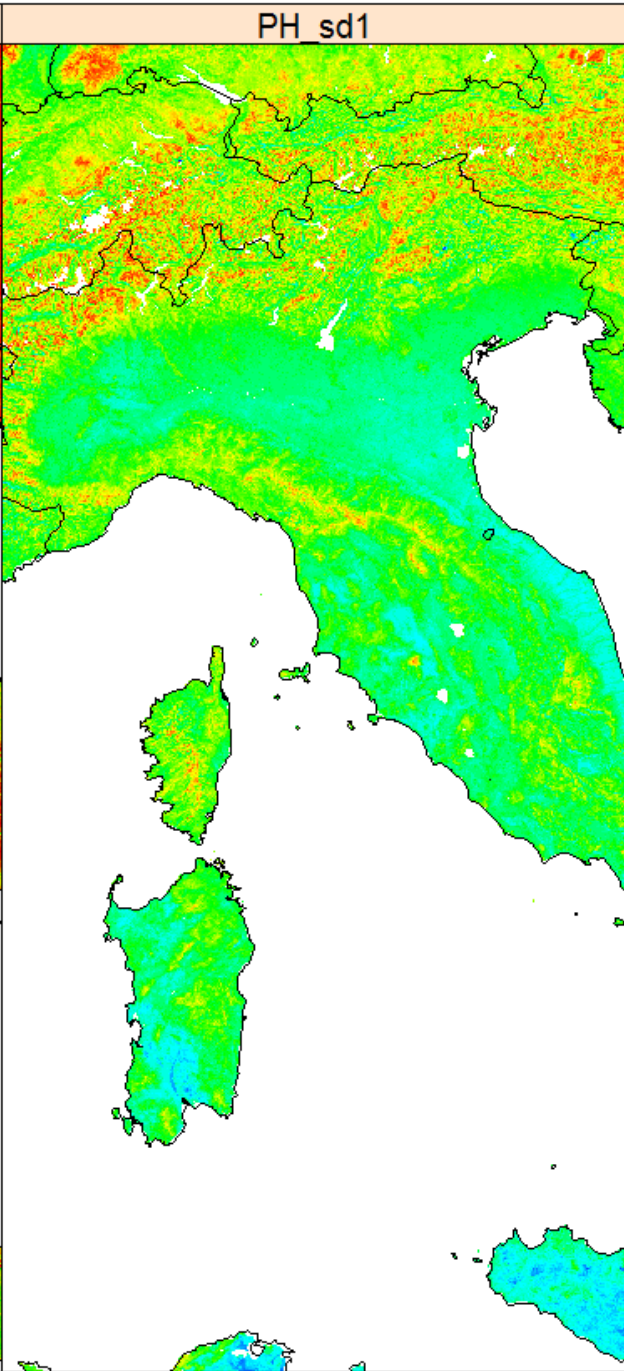
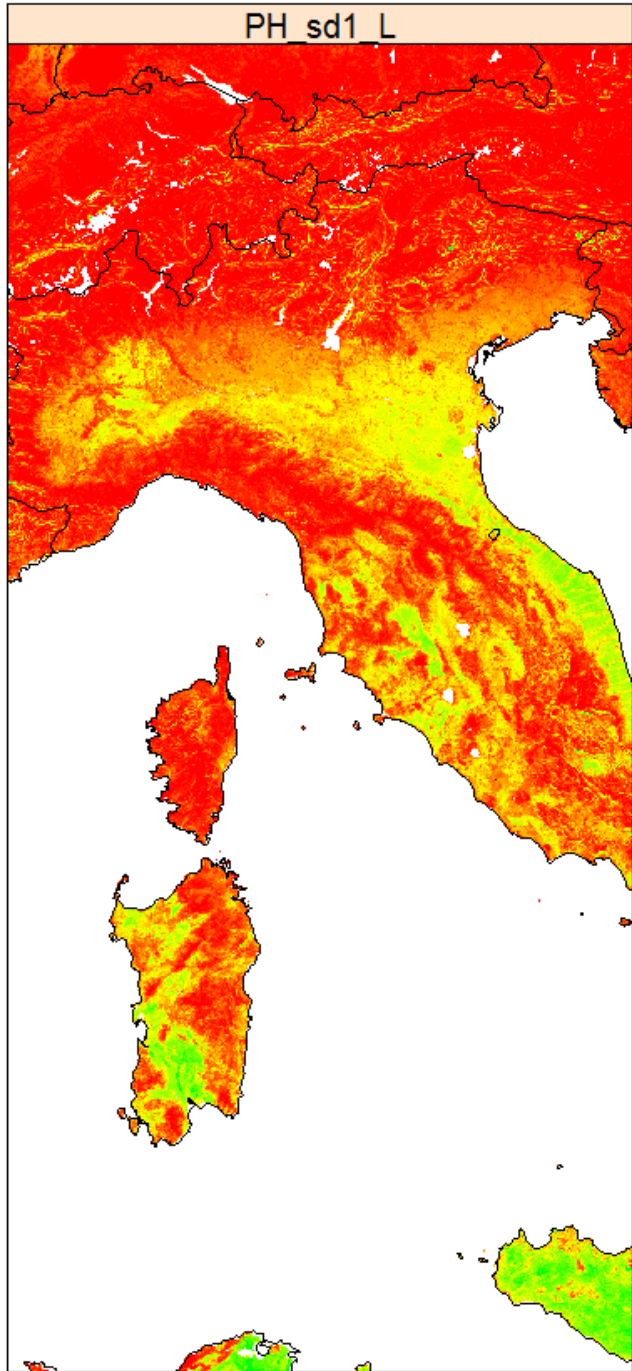
soil pH (60-100 cm)



soil pH (lower)

soil pH (mean)

soil pH (upper)



Summary points

- Prediction of soil properties and soil types can be generated using automated mapping. The first results are promising.
- The keys to success are: (1) compiling and cleaning up global point data (international cooperation), (2) use of global 3D statistical models, (3) crowdsourcing the data evaluation.
- Top-down / bottom-up approach is a flexible framework for multiscale soil data merging (there is room for everyone).



<http://www.soilgrids.org> or <http://soilgrids1km.isric.org>



World Soil Information

ISRIC — World Soil Information

- **ISRIC is the ICSU World Data Centre for Soils (WDC-Soils) since 1989**
- **It has a mandate to serve the international community with information about the world's soil resources to help addressing major global issues.**
- **Since 2010 ISRIC has been developing Global Soil Information Facilities (GSIF)**



Why ISRIC?

- We have the largest compilation of soil profile data in the world.
- We are building facilities (data portals and software) for global soil mapping (this is our mission).
- We can be independent (serving global interests).
- We share the same principles (open access soil data = better soil management / protection) as GSP.



Other points

- **We miss a global map of the soil units (SOTER? updated HWSD?) at 1 km resolution.**
- **To produce SoilGrids requires heavy computation and disk storage. We miss more computing / IT resources.**
- **We need to establish a network of data contributors / evaluators (a Wiki system for soil data). Lets bring the global soil science community to the 21st century!**

